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Index at acceptance:—Class 69(iii), I(1: 5: 14).

COMPLETE SPECIFICATION

Apparatus for the Pulverisation of Liquids in the Form of Aerosols

We, SOCIÉTÉ ANONYME TECO, of 29, rue de la Station, Bois-de-Breux (Liege), Belgium, a body corporate organised under Belgian Law, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to an apparatus for the pulverisation of liquids in the form of aerosols, which may be utilised in all cases where it is required to produce the atomisation of a liquid in a gas, for example air.

It is already known to disposed pulverisers in such a manner that their jets converge, but at a fairly small, included angle, so that no strong impact is produced on the particles and there is therefore no further appreciable division of these particles, but only a more thorough mixing action of the jets, while a large part of the kinetic energy of the jets is preserved.

When it is necessary to pulverise a liquid in a cold condition, in particular when a source of heat is not available or the difficulty arises that the material which is to be placed in suspension in air in the form of aerosols may be changed by the action of heat, the best solution consists in effecting the pulverisation of the liquid by means of a compressed air jet or pulveriser, in which the air in aspirating or in delivering or in mixing with the liquid, projects the latter with extreme violence into the surrounding air.

It is also known that the velocity of the outlet from the jet or pulveriser cannot exceed a certain limit and that the pulverisation will be a function of the energy expended in the shock.

In order to increase this energy and thus

improve the pulverisation, without increasing the velocity at the outlet of the jet, the invention has in view to effect the pulverisation by means of a device for the pulverisation of liquids in the form of aerosols, in which the liquid is pulverised by suitable means, for example, nozzles, delivering the pulverised liquid, alone or mixed with gas. This device is characterised, according to the present invention, in that it comprises at least two nozzles or the like delivering jets comprising particles of pulverised liquid, which are arranged in such manner that each jet is directed towards at least one opposite jet, while one or more additional jets composed solely of gas may, if desired, be directed towards the zone in which the jets of the pulverisers encounter one another.

The small drops of liquid delivered by the nozzles will meet each other with a relative velocity which will be much greater than their individual velocities. Actually for two nozzles arranged one opposite the other, this relative velocity will be equal to the sum of their individual velocities. If the velocities are equal to that of a single jet, the shock energy will thus be quadrupled, seeing that the *vis viva* or momentum is proportional to the square of the velocity.

Preferably the arrangement is such that the axes of the different nozzles are all slightly displaced in the same sense with respect to this same point, these axes being, for example, tangents to a circumference having this point as its centre, so that the combined action of the various jets produces a whirling of the pulverised matter, with the object of causing a more rapid separation of the condensable particles. It has been found, in fact, that it is advantageous to separate as rapidly as

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possible the condensable particles, that is to say, the moist ones, from those which are produced in the state of aerosols, that is to say, not condensable, or dry, in order to avoid the carrying along of these latter by the former, and to thus obtain a better yield in aerosols.

All or certain of the nozzles may, according to the invention, be movable in such manner as to allow the adjustment of their position with respect to that of the other nozzles and thus obtain the optimum conditions of operation according to the nature of the liquids to be pulverised and the nozzle pressure and according to the degree of pulverisation which it is desired to obtain.

For carrying out the invention, nozzles of any suitable type may be used and may be operated by pressure, suction or the combination of both or even nozzles acting by the sole pressure of the liquid without the intervention of a gas, for example air. The nozzles appertaining to the same pulverisation apparatus may be of the same or different nature and deliver either a liquid only or a mixture of liquid and of air or gas whilst some may even deliver only air or gas.

Other features and advantages of the invention will appear from the description of some examples of embodiment given below with reference to the accompanying diagrammatic drawing, in which:

Figures 1 to 3 are axial sectional views of three pulverisation apparatus each comprising two nozzles, and

Figures 4 and 5 are plan views of two modified embodiments of a device comprising three nozzles.

In the example shown by Figure 1, each nozzle comprises a body 1 and a hollow needle 2 which may be adjustable in position, the conduit 3 of which, serving to supply compressed air or any suitable gas, opens into a chamber 4 formed in the body 1 and into which the liquid to be pulverised is aspirated through a tube 5 dipping into a reservoir 6. The mixture of liquid and of air or gas which is formed in the chamber 4 is projected through an orifice 7 in the form of a conical jet. A second nozzle identical to the first is arranged opposite this and produces a similar jet. The meeting of these two jets produces the definite pulverisation of the liquid in the form of an aerosol.

In the case of Figure 2, the hollow needle of the nozzles is replaced by a needle 8 integral with an adjustable screw 9. The liquid is in a closed reservoir 10 and is subjected to the pressure of compressed air or gas supplied through a conduit 11. Under the effect of this pressure the liquid is delivered through the tube 5, the chamber

4 and the orifice 7 to emerge in the form of a jet directed towards a similar jet coming from the second nozzle and to thus produce its pulverisation in the form of aerosol.

Figure 3 shows the combination of nozzles according to Figure 1, with the delivery of the liquid by pressure of air or gas such as described with reference to Figure 2.

As pointed out above, one of the two nozzles may be movable in such manner as to be able to regulate their distance apart by any appropriate mechanical means. In the case of Figures 2 and 3 the connection between the tube 5 and the reservoir 10 must therefore permit the displacement of the nozzles without destroying the fluid-tightness of the said reservoir.

In the case of Figure 4, the three nozzles A which may be of any suitable type, are arranged at an angle of 120° , so that their axes converge towards the centre B of the triangle formed by the outlets of the nozzles. The three jets which may be formed of liquid or of a mixture of liquid and of air or gas, are thus directed one towards the other in such manner that their mutual meeting will ensure a very efficient production of aerosols.

In the example shown by Figure 5, the nozzles are arranged in such manner that their axes are all slightly shifted towards the left with respect to the point B, and are tangents to a circumference having this point as a centre. In addition to the formation of aerosols due to the mutual meeting of the jets, there is produced in this case a whirling movement of the pulverised substance which has the favourable effect of causing a more rapid deposit of the condensable particles.

It will be evident from the foregoing, that the practical embodiment of the invention may take different forms within the scope of the appended claims.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A device for the pulverisation of liquids in the form of aerosols, in which the liquid is pulverised by suitable nozzles or the like, delivering the pulverised liquids, alone or mixed with gas, characterised in that it comprises at least two nozzles delivering jets comprising particles of pulverised liquid, which are arranged in such manner that each jet is directed towards at least one opposite jet, while one or more additional jets composed solely of gas may, if desired, be directed towards the zone in which the jets of the said nozzles encounter one another.

2. A device as claimed in Claim 1, 130

- characterised in that the nozzles are arranged in such manner that their axes are slightly shifted in the same sense with respect to the same point, for example, the
5 point which is at an equal distance from the outlets of the various nozzles, these axes being for example tangents to a circumference having this point at its centre.
- 10 3. A device as claimed in Claim 1 or 2, characterised in that at least some of the nozzles are movable in such manner as to

permit the regulation of their relative position.

4. A device for pulverising liquids in 15 the form of aerosols substantially as described with reference to the accompanying drawing.

Dated this 22nd day of August, 1945.
SOCIETE ANONYME TECO,
per : Boulton, Wade & Tennant,
112, Hatton Garden, London, E.C.1,
Chartered Patent Agents.

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FIG. 1.

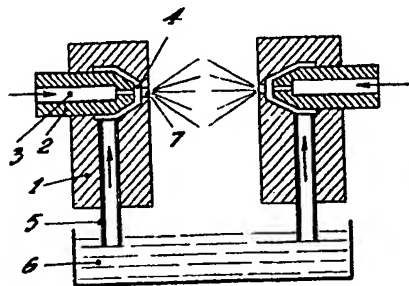


FIG. 2.

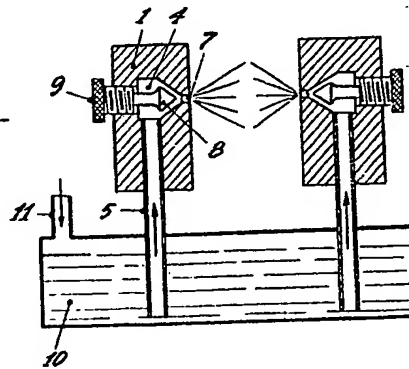


FIG. 3.

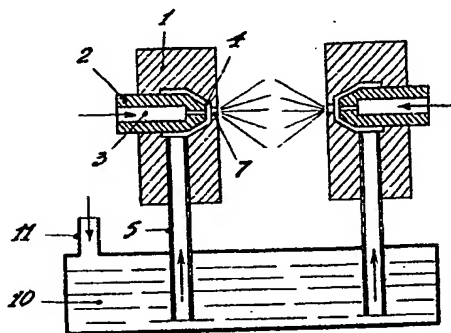


FIG. 4.

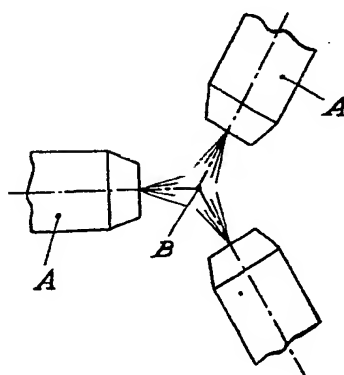
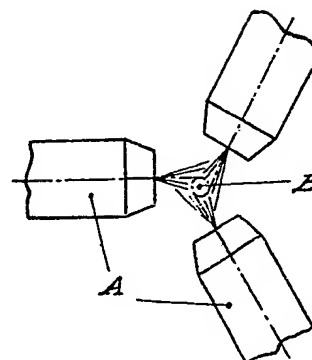


FIG. 5.



[This Drawing is a reproduction of the Original on a reduced scale.]